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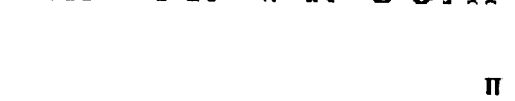
(54) HIGHLY FLUID CONCRETE COMPOSITION, AND SEPARATION REDUCING AGENT AND COPOLYMER FOR THE SAME COMPOSITION

(57)Abstract:

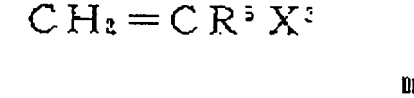
PROBLEM TO BE SOLVED: To obtain the subject copolymer, excellent in material separation resistance and further operating efficiency in a usual factory for producing a ready mixed concrete and capable of providing a useful highly fluid concrete composition by including plural or more specific units in a specified proportion therein.

SOLUTION: This copolymer comprises (A) 40-89wt.% unit derived from a compound represented by formula I (R1 and R2 are each H or methyl) (e.g. N-vinylacetamide), (B) 10-50wt.% unit derived from a compound represented by formula II (R3 is H or methyl; R4 is a 1-4C alkylene; X1 is CONH or COO; X2 is H, an alkali metal, an ammonium salt or an organic ammonium salt) (e.g. 2-acrylamide-2-methyl-propanesulfonic acid) and (C) 1-30wt.% unit derived from a compound represented by formula III [R5 is H or methyl; X3 is CN, COOR6, CONH2 or CONHR7 (R6 is H, an alkali metal, etc.; R7 is a 1-4C alkyl)] (e.g.

I



II



III

acrylonitrile).

LEGAL STATUS

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NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the high fluidity concrete constituent with which material separation resistance was given. The high fluidity stabilized with time in the freshly-mixed-concrete constituent when saying in more detail, Give high restoration nature and high separation resistance, and reduce the compaction at the time of placing, or it is supposed that it is unnecessary. While reducing the noise at the time of construction and improving work and neighboring environment, it is related with a copolymer useful as the engineering works and construction which make concrete placing easy, the high fluidity concrete constituent for precast concretes, the separation reduction agent for the constituents, and a separation reduction agent.
[0002]
[Explanation of background technology] In case concrete is placed, in order to make it spread to all the corners of a mold according to the architecture meeting JASS5 or the Japan Society of Civil Engineers concrete standard specification, it has been a principle to use vibrator and a rammer and to perform careful tamping. However, the noise problem to which vibration of the vibrator covering [a cross-section configuration becomes complicated, or reinforcement is arranged densely, and] the long time for restoration nature insufficient prevention in that sufficient tamping is not made **** does the concrete structure in the neighborhood poses a problem in recent years. Furthermore, the skillful engineers engaged in tamping work are also running short, and it becomes the situation which the defect of workability tends to generate, and is apprehensive about the influence affect the endurance of the concrete structure. Therefore, application of the concrete of the compaction needlessness excellent in a fluidity and restoration nature is desired.
[0003] As a method of manufacturing the concrete which has such a high fluidity, it is possible to increase the increase of the amount of water in concrete, and a consistency. however, only increasing a consistency -- while concrete flows -- homogeneity -- ****** -- the phenomenon of aggregate separation and the phenomenon called so-called bleeding in which kneading water is unevenly distributed to a concrete front face or the circumference of a coarse aggregate after concrete placing arise, and the shape of workability or hardenability of concrete fall For example, if aggregate separation arises, during pump feeding, a coarse aggregate will gear, the phenomenon of lock out will arise, and placing after it will become difficult. moreover, a portion with the narrow crevice where reinforcement, such as a pillar and a wall, is placed densely and concrete flows and a member -- at the end, aggregate separation and bleeding are promoted by careful tamping and it is easy to produce construction defects, such as a honeycomb, a rock pocket, and a cold-joint This becomes the local shortage of intensity of the concrete structure after hardening, and a factor with poor endurance. If the layer called laitance to the upper surface when bleeding is excessive is formed thickly, the placing side upper part strikes and it does not fully grind covering considerable thickness before a splice, the case where it is difficult to secure the bond strength between old and new concrete will arise. When the bleeding of the circumference of a coarse aggregate is excessive, it will remain as a weak on-the-

strength field after concrete hardening. Since this field is also porosity, it tends to cause the invasion of moisture or air. If the carbon dioxide gas in air invades, it will react with an alkaline calcium hydroxide by the hydrate of cement, and this will be changed to a neutral calcium carbonate. If concrete carbonates, it becomes easy to carry out rusting of the reinforcement, therefore it may result in expansion destruction. Moreover, an invasion of moisture causes on-the-strength degradation, for example in winter repeatedly [of a freeze and dissolution]. Therefore, it becomes important not to generate the above aggregate separation or bleeding.

[0004] On the other hand, when it considers as concrete, the method of reducing the amount of water to fine particles to the grade which neither aggregate separation nor bleeding can generate easily is also in fine particles, such as cement which is excellent in a fluidity, combining the admixture which improves a water-reducing action and a fluidity sharply. However, the amount of cement is made to increase in this case, the calorific value of concrete is increased depending on the kind of fine particles, and, occasionally it results in generating of the crack by thermal stress. Furthermore, it becomes, and becomes small, and a water cement ratio (W/C) also brings about about 40% or less and the superfluous intensity far exceeding design strength, and can say that they are a superfluous design economically and in quality. In addition, although there is also the method of replacing some cement by the fine particles which do not have other hydraulic properties to the grade which can secure sufficient fluidity, the intensity at the time of mold unmolding is low, and application to a building construction becomes difficult.

[0005] The separation reduction agent which consists of a water soluble polymer which reduces separation of each material of concrete from the above background to the concrete of general combination is added, and the technique of obtaining a high fluidity and restoration nature has been proposed, without increasing the amount of cement (for example, cement concrete No.578, 10 - 21 pages, and 1995).

[0006] As a water soluble polymer generally used, there are cellulosic; poly saccharides, such as the methyl-cellulose ether, the hydroxypropyl ethyl-cellulose ether, the methyl hydroxyethyl methyl-cellulose ether, a hydroxyethyl cellulose ether, and a hydroxypropyl cellulose ether, curdlan, a dextran, starch, ZANTANGAMU, a polyacrylamide, etc. The viscosity of freshly mixed concrete increases and these water soluble polymers have the problem that a fluidity falls, when adding sufficient amount to suppress material separation (JP,5-139806,A). Moreover, if the water reducing agent used in order to raise the fluidity of freshly mixed concrete is used together, in many cases, a fluidity is checked by the interaction of a water soluble polymer with a water reducing agent, and it has become a very difficult situation to secure the viscosity made into the purpose and a fluidity (JP,6-293542,A, 8-12397).

[0007] Moreover, since saccharides, such as a cellulosic, produce decomposition in the state of solution, they have many problems -- it cannot save for a long period of time. Furthermore, by currently possessed facility of the usual freshly-mixed-concrete works, although water soluble polymers, such as a methyl cellulose, have the thing of a powdered gestalt in use, when powdered, since it cannot add, but correspondence called establishment of the manual injection or injection facility by human power is needed and work becomes complicated, it is in the situation which cannot spread easily.

[0008] Although the copolymer of N-vinyl acetamide compound and a 2-acrylamide-isobutane sulfonate was indicated as a water soluble polymer for material separation suppression by JP,2-23566,B, since the use was an assistant for water-soluble boring, even if there was a fluid fall with time, practical trouble was not produced and regarded as questionable in this case where only the effect of suppression of material separation is required.

[0009]

[Problem(s) to be Solved by the Invention] Therefore, the technical problem of this invention is to offer the useful high fluidity concrete constituent which is excellent in material separation resistance and is excellent in the workability in a general freshly-mixed-concrete plant. Also in combined use

addition with a water reducing agent, other technical problems of this invention give the high fluidity stabilized with time in freshly mixed concrete, without causing fluid prevention, good restoration nature, and the resistance over material separation, and are about the compaction work at the time of placing to offer reduction or the separation reduction agent for high fluidity concrete constituents made unnecessary. Furthermore, other technical problems of this invention are to offer a copolymer useful as a separation reduction component of a high fluidity concrete constituent.
[0010]
[Means for Solving the Problem] As a result of repeating examination wholeheartedly in view of such a technical problem, this invention persons The water soluble polymer of N-vinyl carboxylic-acid amide system containing a new copolymer does not check the fluidity of freshly mixed concrete in sufficient concentration to suppress material separation of a high fluidity concrete constituent, The water soluble polymer of the aforementioned N-vinyl carboxylic-acid amide system moreover, by using together cement dispersing agent, such as a high-performance AE water-reducing agent or a highly efficient water reducing agent It checked being able to manufacture easily, without bringing about the complicatedness of work in the usual freshly-mixed-concrete plant, the freshly-mixed-concrete constituent obtained having the high fluidity stabilized with time, high restoration nature, and high separation resistance, shutting it at the time of placing, and reducing hammer hardening, or supposing that it is unnecessary.
[0011] That is, this invention is 1. General formula (1)
Ceta2=CHNR1COR2 (1)
(-- among a formula, even if R1 and R2 are the same, they may differ from each other, and they express an each hydrogen atom or a methyl group 40 - 89 % of the weight of units originating in the compound shown by), and general formula (2)
CH2=CR3X1R4SO3X2 (2)
(-- R3 expresses a hydrogen atom or a methyl group among a formula, R4 expresses the straight chain-like alkylene machine of carbon numbers 1-4, or the letter alkylene machine of branching, X1 expresses -CONeta- or -COO-, and X2 expresses a hydrogen atom, alkali metal, an ammonium salt, or an organic ammonium salt 10 - 50 % of the weight of units originating in the compound shown by), and general formula (3)
Ceta2=CR 5X3 (3)
(R5 expresses a hydrogen atom or a methyl group among a formula, and X3 expresses -CN, -COOR6, -CONeta2, -CONHR7, -COR8, -OCOR9, or -OR10.) However, R6 expresses the alkyl group of a hydrogen atom, alkali metal, an ammonium salt, an organic ammonium salt, or carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by Oeta or -NR 11R12. Moreover, R7 expresses the alkyl group of carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by OH or -NR 11R12. R8, R9, R10, R11, and R12 express the alkyl group of carbon numbers 1-4 1 - 30 % of the weight (general formula (1) total of the unit originating in the compound shown by - (3) may be 100 % of the weight.) of units originating in the compound shown from -- becoming copolymer;
[0012] 2) General formula (1)
Ceta2=CHNR1COR2 (1)
(-- among a formula, even if R1 and R2 are the same, they may differ from each other, and they express an each hydrogen atom or a methyl group 10 - 100 % of the weight of units originating in the compound shown by), and general formula (2)
CH2=CR3X1R4SO3X2 (2)
(-- R3 expresses a hydrogen atom or a methyl group among a formula, R4 expresses the straight chain-like alkylene machine of carbon numbers 1-4, or the letter alkylene machine of branching, X1 expresses -CONeta- or -COO-, and X2 expresses hydrogen, alkali metal, an ammonium salt, or an organic ammonium salt 0 - 60 % of the weight of units originating in the compound shown by), and general formula (3)

Ceta2=CR 5X3 (3)
(R5 expresses a hydrogen atom or a methyl group among a formula, and X3 expresses -CN, -COOR6, -CONeta2, -CONHR7, -COR8, -OCOR9, and -OR10.) However, R6 expresses the alkyl group of a hydrogen atom, alkali metal, an ammonium salt, an organic ammonium salt, or carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by Oeta or -NR 11R12. Moreover, R7 expresses the alkyl group of carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by OH or -NR 11R12. R8, R9, R10, R11, and R12 express the alkyl group of carbon numbers 1-4 0 - 40 % of the weight (general formula (1) total of the unit originating in the compound shown by - (3) may be 100 % of the weight.) of units originating in the compound shown Separation reduction agent for high fluidity concrete constituents characterized by the bird clapper from a polymer (**);
[0013] 3) Separation reduction agent for high fluidity concrete constituents given in the above 2 which consists of a polymer of the unit originating in the compound shown by the general formula (1);
4) Separation reduction agent for high fluidity concrete constituents given in the above 2 which consists of 40 - 89 % of the weight of units originating in the compound shown by the general formula (1), 10 - 50 % of the weight of units originating in the compound shown by the general formula (2), and 1 - 30 % of the weight (however, total of the unit originating in the compound shown by general formula (1) - (3) may be 100 % of the weight. of units originating in the compound shown by the general formula (3);
5) Separation reduction agent for high fluidity concrete constituents given in the above 3 or 4 whose 1.2-% of the weight solution viscosity of the cement supernatant of a polymer (**) given in the above 3 or 4 is less than 200cps in 20cps or more in B type rotational viscometer;
[0014] 6) It consists of cement, a coarse aggregate, a fine aggregate, cement dispersing agent, a separation reduction agent, and water, and a separation reduction agent is a general formula (1) at least.
Ceta2=CHNR1COR2 (1)
(-- among a formula, even if R1 and R2 are the same, they may differ from each other, and they express an each hydrogen atom or a methyl group High fluidity concrete constituent; characterized by being a polymer including the unit (**) originating in the monomer shown by)
[0015] 7) It consists of cement, a coarse aggregate, a fine aggregate, cement dispersing agent, a separation reduction agent, and water, and a separation reduction agent is a general formula (1).
Ceta2=CHNR1COR2 (1)
(-- among a formula, even if R1 and R2 are the same, they may differ from each other, and they express an each hydrogen atom or a methyl group 40 - 89 % of the weight of units originating in the monomer shown by), and general formula (2)
CH2=CR3X1R4SO3X2 (2)
(-- R3 expresses a hydrogen atom or a methyl group among a formula, R4 expresses the straight chain-like alkylene machine of carbon numbers 1-4, or the letter alkylene machine of branching, X1 expresses -CONeta- or -COO-, and X2 expresses a hydrogen atom, alkali metal, an ammonium salt, or an organic ammonium salt 10 - 50 % of the weight of units originating in the compound shown by), and general formula (3)
Ceta2=CR 5X3 (3)
(R5 expresses a hydrogen atom or a methyl group among a formula, and X3 expresses -CN, -COOR6, -CONeta2, -CONHR7, -COR8, -OCOR9, or OR10.) However, R6 expresses the alkyl group of a hydrogen atom, alkali metal, an ammonium salt, an organic ammonium salt, or carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by Oeta or -NR 11R12. Moreover, R7 expresses the alkyl group of carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by OH or -NR 11R12. R8, R9, R10, R11, and R12 express the alkyl group of carbon numbers 1-4 1 - 30 % of the weight (general formula (1) total of the unit originating in the compound

shown by - (3) may be 100 % of the weight.) of units originating in the compound shown High fluidity concrete constituent given in the above 6 which is the polymer included (**);
[0016] 8) High fluidity concrete constituent given in the above 6 or 7 whose 1.2-% of the weight solution viscosity which used the cement supernatant is 20-200cps;
9) The above 6 whose content of a separation reduction agent is 10 - 200 g/m3 to the total amount of a high fluidity concrete constituent, or high fluidity concrete constituent given in either of 8;
10) the amount of unit cement of concrete 1 ** -- the unit quantity of 200 - 450 kg/m3 and a fine aggregate -- the unit quantity of 700 - 1,100 kg/m3 and a coarse aggregate -- 700 - 1,200 kg/m3 and a unit -- the above 6 whose addition of the separation reduction agent whose amount of water is 155 - 220 kg/m3 and a water soluble polymer is 10 - 200 kg/m3, or given in either of 9 high fluidity concrete constituent;
11) the above 6 whose slump flow value by JIS A 1101 maintains 45cm or more over [after kneading] at least 60 minutes or given in either of 10 high fluidity concrete constituent;, and 12 some cement -- initial hydration of brain trust specific-surface-area of 2,500-200,000cm 2/g -- the above 6 replaced to 50 weight sections by the inactive impalpable powder or either of 11 is provided with the high fluidity concrete constituent of a publication
[0017]
[Embodiments of the Invention]
The separation reduction agents for the high fluidity concrete constituents of the separation reduction agent this invention for high fluidity concrete constituents are N-vinyl carboxylic-acid amide system water soluble polymer, i.e., the homopolymer of the compound shown by the following general formula (1), and a copolymer which has a unit originating in following general formula (1) - (3) at a specific rate, and it is characterized by the 1.2-% of the weight solution viscosity which used the cement supernatant being in the specific range.
[0018]
Ceta2=CHNR1COR2 (1)
CH2=CR3X1R4SO3X2 (2)
Ceta2=CR 5X3 (3)
R1, R2, R3, and R5 express a hydrogen atom or a methyl group among the above-mentioned formula, and R4 expresses the straight chain-like alkylene machine (a methylene, ethylene, a propylene, butylene machine) of carbon numbers 1-4, or the letter alkylene machine of branching (1 and 1-dimethyl ethylene, 2, and 2-dimethyl ethylene, 1-methyl propylene, 2-methyl propylene, 3-methyl propylene). X1 expresses -CONH- or -COO-, X2 expresses a hydrogen atom, alkali metal (for example, sodium, a potassium), an ammonium salt, and an organic ammonium salt (for example, triethyl ammonium salt), and X3 expresses -CN, -COOR6, -CONH2, -CONHR7, -CONR eight R9, -COR10, -OCOR11, and -OR12.
[0019] R6 However, a hydrogen atom, alkali metal (for example, sodium, a potassium), the alkyl group (a methyl --) of an ammonium salt, an organic ammonium salt, or carbon numbers 1-4 Ethyl, a propyl, and a butyl are expressed and it is at least one hydrogen atom in this alkyl group. - It can replace by OH or -NR 11R12. R7 expresses the alkyl group (for example, a methyl, ethyl, a propyl, a butyl) of carbon numbers 1-4, and is at least one hydrogen atom in this alkyl group. - It can replace by OH or -NR 11R12. R8, R9, R10, R11, and R12 express the alkyl group (a methyl, ethyl, a propyl, butyl) of carbon numbers 1-4. It is desirable. - Dimethylamino and a diethylamino machine are mentioned as NR 11R12.
[0020] this invention -- setting -- a separation reduction agent -- ** -- the example of the monomer used as the raw material of the polymer shown by aforementioned general formula (1) - (3) which are used by carrying out (**) is given to below As a compound shown by the general formula (1), for example, N-vinyl formamide, N-vinyl acetamide, an N-methyl-N-vinyl formamide, and an N-methyl-N-vinyl acetamide are mentioned, and N-vinyl acetamide is desirable.
[0021] As a compound shown by the general formula (2), for example A 2-acrylamide-isobutane

sulfonic acid, 2-acrylamide ethane sulfonic acid, 2-methacrylamide ethane sulfonic acid, 3-methacrylamide propane sulfonic acid, a methyl-acrylate sulfonic acid, A methyl-methacrylate sulfonic acid, an acrylic-acid-2-ethyl sulfonic acid, A methacrylic-acid-2-ethyl sulfonic acid, an acrylic-acid-3-propyl sulfonic acid, A methacrylic-acid-3-propyl sulfonic acid, an acrylic-acid-2-methyl-3-propyl sulfonic acid, A methacrylic-acid-2-methyl-3-propyl sulfonic acid, an acrylic acid -1, a 1-dimethyl-2-ethyl sulfonic acid, a methacrylic acid -1, 1-dimethyl-2-ethyl sulfonic acids, or these **** are mentioned.

[0022] moreover, as a compound shown by the general formula (3) For example, methyl acrylate, ethyl bitter taste relay **, propylacrylate, 2-hydroxyethyl bitter taste relay **, acrylamide, N, and N-dimethylamino ethyl acrylate, N and N-dimethylamino propyl acrylamide, acrylonitrile, A methyl vinyl ketone, an ethyl vinyl ketone, a propyl vinyl ketone, Vinyl acetate, the methyl vinyl ether, ethyl vinyl ether, Propyl vinyl ether, methyl methacrylate, ethyl methacrylate, Propyl methacrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, Although compounds, such as N and N-dimethylaminoethyl methacrylate, methacrylamide, N-isopropyl acrylamide, N, and N-dimethylaminopropyl methacrylamide, N, and N-dimethyl acrylamide, N, and N-diethyl acrylamide, can be mentioned Acrylonitrile is desirable especially.

[0023] The above-mentioned general formula (1) the rate of the unit originating in - (3) The unit originating in the compound shown by the general formula (1) At least 10 % of the weight, General formula (2) The unit originating in the compound in which the unit originating in the compound shown is shown by the general formula (3) zero to 60% of the weight is 0 - 40 % of the weight (general formula (1) total of the unit originating in the compound shown by - (3) is 100 % of the weight.). it is -- the homopolymer which consists of a unit originating in the compound shown by the general formula (1) is sufficient as all

[0024] The unit which originates in the compound shown by the general formula (1) preferably 40 - 89 % of the weight, The unit originating in the compound which is 5omicron-70 % of the weight more preferably, and is shown by the general formula (2) 10 - 50 % of the weight, It is 20 - 40 % of the weight more preferably, and the unit originating in the compound shown by the general formula (3) is the copolymer which consists of 5 - 20 % of the weight more preferably one to 30% of the weight (however, there is 100 % of the weight of total of the component originating in the monomer shown by general formula (1) - (3).). . Such a copolymer is a new water-soluble-polymer compound.

[0025] In the water soluble polymer as a separation reduction agent for concrete, the viscous grant to freshly mixed concrete becomes it inadequate that the content of the unit originating in the compound shown by the general formula (1) is less than 10 % of the weight depending on the molecular weight of a water soluble polymer. When the content of the unit originating in the compound shown by the general formula (2) exceeds 60 % of the weight, sufficient viscous grant becomes difficult and it is in the inclination which material separation produces. Since the hydrophilic property of a polymer falls and viscosity and a fluidity cannot be given to a freshly-mixed-concrete constituent when the content of the unit originating in the compound shown by the general formula (3) exceeds 40 % of the weight, it is in the inclination which material separability produces.

[0026] The range of the 1.2-% of the weight solution viscosity in 20 degrees C is less than 200cps in 20cps or more, and the polymer used as a separation reduction agent for concrete constituents of this invention has it in the range of 40 to 180cps more preferably. Since material separation arises when solution viscosity is less than 20cps, it is not desirable. On the other hand, when this viscosity exceeds 200cps, there is an inclination for a with-time fluidity (slump flow value of 60 minutes after) to fall.

[0027] In addition, in this invention, after the 1.2-% of the weight solution viscosity of a polymer adds 3l. of water to Portland cement 30g and agitates it for 30 minutes, it is the value which measured the viscosity of the solution which prepared the polymer to 1.2% of the weight of concentration by 60rpm with the Brook feed type rotational viscometer using the supernatant put and made. Since the polymer (**) of this invention has a Nonion nature hydrophilic group originating in the unit

expressed with a general formula (1), its solubility to the cement water which is strong-base nature is good, and excellent also in the material separation resistance of concrete ********.
[0028] Moreover, when using high fluidity concrete by on-site construction, time to convey concrete from a freshly-mixed-concrete plant to a construction site is required. Therefore, it is required [that there is no big change in the fluidity, or] even if it passes through time about 60 minutes from from immediately after manufacturing freshly mixed concrete. After filling up a slump cone with freshly mixed concrete as the index, it is called for that the slump flow value after 60-minute progress is 45cm or more. While a fluidity (an early slump flow value is 60cm or more) with the separation reduction agent for concrete constituents of this invention moderate to a concrete constituent also from such a point can be given, it excels also in with-time stability (the slump flow value of 60 minutes after is 45cm or more), and it has the property suitable as a separation reduction agent for high fluidity concrete.
[0029] As a method of manufacturing the polymer used for a separation reduction agent by the manufacture method this invention of a separation reduction agent (**), although methods, such as aqueous polymerization, an antiphase suspension polymerization, and a precipitation **** polymerization, can be used, it is not necessarily limited to especially these methods. The usual radical polymerization initiator can be used for a polymerization initiator. 2 and 2'-azobis (2-amidinopropane) dihydrochloride, 2 and 2'-azobis [2-(2-imidazoline-2-IRU) propane] dihydrochloride, 2 and 2'-azobis [2-(3, 4, 5, 6-tetrahydro pyrimidine-2-IRU) propane] dihydrochloride, 2 and 2'-azobis [-- 2- (5-hydroxy-3, 4 and 5, and 6-tetrahydro pyrimidine-2-IRUPUROPAN] dihydroClyde --) 2 and 2'-azobis [-- 2- (azo system initiators, such as N-** NJIRU amidinopropane] dihydrochloride, --) The so-called redox-system initiator which makes reducing agents, such as peroxides, such as t-butyl hydronalium peroxide and succinic-acid peroxide, a peroxide or persulfates and a ** RIETA Norian amine, and a sodium thiosulfate, exist in the same system is mentioned.
[0030] n-butyl mercaptan which has a chain-transfer operation as a regulator of solution viscosity, a ** RIECHIRU amine, isopropyl alcohol, thioglycolic-acid ammonium, sodium hypophosphite, etc. are used. The polymerization object obtained by aqueous polymerization is dried and ground, and after making it powdered, it is remelted and used. Moreover, it filters and dries, and the polymerization object obtained by the antiphase suspension polymerization is remelted and used after making it powdered. Moreover, a powdered polymerization object can also be added as it is.
[0031] The high fluidity concrete constituent of a high fluidity concrete constituent this invention consists of cement, a coarse aggregate, a fine aggregate, cement dispersing agent and the above-mentioned separation reduction agent, and water. As mineral composition, 23 % of the weight and 3 CaO-aluminum 2O3 are not restricted [CaO-SiO] for specific surface area to this by the example of representation of the cement used as a material of a concrete constituent, although 52 % of the weight and 2 CaO-SiO2 are the so-called ordinary portland cements which are about [3,300cm] 2/g, for example, 3 CaO-SiO2 content including 9 % of the weight and other CaO-Fe 2O3. Water is preferably added 50 to 55% of the weight 45 to 55% of the weight to a cement weight.
[0032] Although especially cement dispersing agent does not limit, it is desirable to use one sort or two sorts or more of admixtures chosen from the group of the AE water-reducing agent of the highly efficient water reducing agent of the high-performance AE water-reducing agent of a polycarboxylic-acid system or a naphthalene system, a melamine sulfonic-acid system, a high condensation triazine system, an alkylaryl-sulfonic-acid system, or a naphthalene sulfonic-acid system, a lignosulfonic acid, and a hydroxy-acid system.
[0033] this invention uses together the admixture which does not have a separation reduction operation in this among these cement dispersing agent, using a high-performance AE water-reducing agent or the thing which mixed the separation reduction agent to the high-performance AE water-reducing agent beforehand, and is characterized by making concrete contain in the form mixed to kneading underwater. Thereby, the concrete constituent which has a high fluidity and separation

resistance by the existing tankage can be manufactured, without extending manufacturing facilities, such as an admixture tank.
[0034] the concrete constituent which consists of the above material -- a constituent total amount -- receiving -- the unit quantity of cement -- 200 - 450 kg/m3 -- more -- desirable -- the unit quantity of 250 - 400 kg/m3 and a fine aggregate -- 700 - 1,100 kg/m3 -- more -- desirable -- the unit quantity of 800 - 1,000 kg/m3 and a coarse aggregate -- 700 - 1,200 kg/m3 -- more -- desirable -- the unit quantity of 800 - 1,100 kg/m3 and water -- 170 - 220 kg/m3 -- it considers as the range of 175 -
[0035] In three or less 200 kg/m, the unit quantity of cement becomes superfluous [intensity], although on-the-strength manifestation nature and aggregate separation resistance fall, and a fluidity and aggregate separation resistance generally increase when [than 450 kg/m3] more. although it becomes remarkable in three or less 700 kg/m dissociating a fine aggregate with a coarse aggregate and a cement paste and viscosity increases in three or more 1,100 kg/m -- a unit -- a good character is not securable unless it increases amount of water and an admixture addition In three or less 700 kg/m, the amount of fine aggregates and the amount of cement of a coarse aggregate increase inevitably, and the above-mentioned unfavorable trend becomes remarkable. While aggregate separation resistance falls [a coarse aggregate] with shortage for mortar by three or more 1,200 kg/m, gap permeability also falls by engagement of coarse aggregates. Similarly, by three or less 170 kg/m, a fluidity runs short of the unit quantity of water, and the separation inclination of a coarse aggregate and mortar arises in three or more 220 kg/m.
[0036] moreover, initial hydration -- addition of an inactive impalpable powder can give a much more good fluidity the particle size of an impalpable powder -- brain trust specific-surface-area 2,500-200,000cm2/g -- it is preferably referred to as 4,000-200,000cm2/g As a kind of impalpable powder, silica flours, such as a blast furnace slag, fly ash, silica fumes, and a limestone impalpable powder, etc. are mentioned. About 0 - 50% of the weight of the cement weight of the substitutional rate to cement is desirable. If a substitutional rate exceeds 50 % of the weight, fear that intensity is insufficient will arise. The improvement in a fluidity [replace / some fine aggregates / furthermore / by the impalpable powder] is obtained. The substitutional rate in this case becomes about 0 - 5 % of the weight.
[0037] Although the addition of the separation reduction agent to concrete is made into 10 - 200 g/m3, it is desirable to consider as three or more 20 g/m and less than three 80 g/m from the point of a still more economical design, for acquiring sufficient material separation resistance. When there are few additions than 10 g/m3, separation with a coarse aggregate and a mortar portion becomes remarkable, and when [than 200 g/m3] more, a fluidity is rather reduced for viscous increase.
[0038] About the manufacture method of the concrete constituent of this invention, it is the same as that of the common concrete in the usual freshly-mixed-concrete works. That is, the coarse aggregate and fine aggregate in cement and surface dryness are beforehand fed into a mixer, and it mixes. Next, it kneads by adding into the above-mentioned material with the form which contained admixtures, such as cement dispersing agent, in kneading underwater.
[0039] In the above-mentioned concrete constituent, it scours, and the slump flow value after going up has the insufficient fluidity of less than 45cm, and a big and rough opening tends to remain in concrete. In 70cm or more, the integrity reservation of a mortar portion and a coarse-aggregate portion under flow becomes difficult, and it is easy to produce aggregate separation. Therefore, it is desirable to adjust the addition of a high-performance AE water-reducing agent and an AE water-reducing agent so that 45-70cm can be secured over at least 60 minutes.
[0040] According to this separation reduction agent, such a trouble is avoided although complicated work, such as a manual injection by human power, is caused when adding a fine-particles type separation reduction agent. Moreover, in the advanced technology (for example, concrete combination constituent given in JP,7-91103,B), although the addition of a powdered cellulose system separation reduction agent or the acrylic separation reduction agent of a liquid requires about 250-1,500g per three 1m of concrete constituents, the separation reduction agent of this invention can

secure material separation resistance sufficient [1m of concrete constituents] with a very few addition called per [20-80g] three. Therefore, it also becomes possible to reduce the organic component under concrete combination composition, and it is advantageous on the physical properties of concrete.
[0041] As for the compressive strength of concrete, two or more [20Ns //mm] are common in age 28 days. Although a high strength concrete which exceeds 2 [60Ns / /] mm is also being put in practical use now, in a high strength concrete, it is desirable for there to be a problem of long age strength or calorific value, and to use it in the on-the-strength region of two or less / 60Ns //mm].
[0042]
[Example] this invention is not limited by the following example, although the example of manufacture of the polymer (**) used as a separation reduction agent for concrete constituents of this invention, the example of the high fluidity concrete constituent of this invention, and the example of comparison are given to below and the contents of this invention are more concretely explained to it. In addition, in the following example, that it is with "(**)the solution viscosity in 1.2% of the weight of a polymer" means "(**)the solution viscosity in 1.2% of the weight of the cement supernatant liquor of a polymer" altogether as the part of the paragraph number 27 explained previously.
[0043] [Example of manufacture] In the following example of manufacture, the infrared absorption spectrum was measured using JASCOFT/IR8000 (product made from Japanese Duty Light) infrared spectrophotometer.
[0044] Example [of Manufacture] 1: N-vinyl acetamide (NVA) (250g) is put in, and water (740g) was added to the polymerization glass reactor of N-vinyl acetamide (NVA), and it was made to dissolve in it. After nitrogen aeration removed dissolved oxygen in a 30-degree C thermostat, 2 and 2'-azobis [2-(2-imidazoline-2-IRU) propane] dihydrochloride (0.15g) dissolved in water (10g) was added, and it was made to react under nitrogen aeration. The product was dried at 50 degrees C after the reaction end for 5 hours. After removing water enough, it was made the powder of 100 or less meshes with the small crusher. The solution viscosity in 1.2% of the weight of the obtained copolymer was 178cps. The infrared (IR) absorption spectrum (KBr disk) of the obtained polymer is shown in drawing 1 . Moreover, the result also containing the characteristic absorption of IR is collectively shown in Table 1.
[0045] Example [of Manufacture] 2: A 2-acrylamide-isobutane sulfonic acid (AMPSNa) (30g) is put in, and water (893g) was added to the copolymerization glass reactor of N-vinyl acetamide (NVA), a 2-acrylamide-isobutane sulfonic acid (AMPSNa), and bitter taste RIRONI ** Lil (AN), and it was made to dissolve in it. After adjusting to peta8 by adding a sodium hydroxide, N-vinyl acetamide (NVA) (60g) and thioglycolic-acid ammonium (0.01g) were dissolved. After a reactor was immersed into a 50-degree C thermostat, it agitated contents violently and nitrogen aeration removed dissolved oxygen, bitter taste RIRONI ** Lil (AN) (10g) and 2, and 2'-azobis (2-amidinopropane) dihydrochloride (1.0g) was added, and it was made to react under nitrogen aeration. The 1.2-% of the weight solution viscosity of the obtained copolymer was 77cps. A result is shown in Table 1.
[0046] Example [of Manufacture] 3: A 2-acrylamide-isobutane sulfonic acid (AMPSNa) (48g) is put in, and water (893g) was added to the copolymerization glass reactor of N-vinyl acetamide (NVA), a 2-acrylamide-isobutane sulfonic acid (AMPSNa), and bitter taste RIRONI ** Lil (AN), and it was made to dissolve in it. After adjusting to peta8 by adding a sodium hydroxide, N-vinyl acetamide (NVA) (47g) and thioglycolic-acid ammonium (0.1g) were dissolved. After a reactor was immersed into a 60-degree C thermostat, it agitated contents violently and nitrogen aeration removed dissolved oxygen, acrylonitrile (AN) (5g) and 2, and 2'-azobis (2-amidinopropane) dihydroRAIDO (1.0g) was added, and it was made to react under nitrogen aeration. Obtained copolymer 1.2-% of the weight solution viscosity was 43cps. A result is shown in Table 1.
[0047] Example [of Manufacture] 4: (30g) is put in for a 2-acrylamide-isobutane sulfonic acid (AMPSNa), and water (990g) was added to the copolymerization glass reactor of N-vinyl acetamide (NVA) and a 2-acrylamide-isobutane sulfonic acid (AMPSNa), and it was made to dissolve in it. By

the sodium hydroxide, it adjusted to peta8 and N-vinyl acetamide (NVA) (70g) and thioglycolic-acid ammonium (0.03g) were dissolved. After a reactor was immersed into a 50-degree C thermostat, it agitated contents violently and nitrogen aeration removed dissolved oxygen, the 2 and 2'-azobis (2-amidinopropane) dihydrochloride (1.0g) dissolved in water (5g) was added, and it was made to react under nitrogen aeration. The 1.2-% of the weight solution viscosity of the obtained copolymer was 53cps. A result is shown in Table 1.

[0048] Example [of Manufacture] 5: An N-methyl-N-vinyl acetamide (NMVA) (95g), methyl methacrylate (MMA) (5g), and thioglycolic-acid ammonium (0.0625g) are put into the copolymerization glass reactor of an N-methyl-N-vinyl acetamide (NMVA) and methyl methacrylate (MMA), and water (360g) was added and it was made to dissolve. After nitrogen aeration removed dissolved oxygen in 20-degree-C thermostat, 2 and 2'-azobis [2-(2-imidazoline-2-IRU) propane] dihydrochloride (0.2g) dissolved in water (10g) was added, and it was made to react under nitrogen aeration. The viscosity of the 1.2-% of the weight solution of obtained ******** was 55cps. The obtained result is shown in Table 1.

[0049] Example [of Manufacture] 6: A 2-acrylamide-isobutane sulfonic acid (AMPSNa) (20g) is put in, and water (990g) was added to the copolymerization glass reactor of N-vinyl formamide (NVA), a 2-acrylamide-isobutane sulfonic acid (AMPSNa), and N and N-dimethyl acrylamide (DMAM), and it was made to dissolve in it. By the sodium hydroxide, it adjusted to peta8 and N-vinyl formamide (NVA) (78g), N, and N-dimethyl acrylamide (DMAM) (2g) and sodium hypophosphite (0.1g) were dissolved. After ****(ing) a reactor in a 55-degree C thermostat, agitating contents violently and nitrogen aeration's removing dissolved oxygen, 2 and 2'-azobis (2-amidinopropane) dihydrochloride (1.0g) was added, and it was made to react under nitrogen aeration. After the reaction end, after drying the product at 50 degrees C for 5 hours and removing water enough, it was made the powder of 100 or less meshes with the small crusher. The viscosity of the 1.2-% of the weight solution of the obtained copolymer was 183cps. A result is shown in Table 1.

[0050] The examples 7-14 of manufacture: The examples 10 and 14 of manufacture made the monomer of a publication react [examples / 7, 8, 9, 11, 12, and 13 / of manufacture] to Table 1 according to the example 6 of manufacture according to the example 2 of manufacture. The obtained result is shown in Table 1.

[0051] A 2-acrylamide-isobutane sulfonic acid (AMPSNa) (70g) is put in, and water (700g) was added to the copolymerization glass reactor of an example of comparison manufacture 1:N-vinyl acetamide (NVA), a 2-acrylamide-isobutane sulfonic acid (AMPSNa), and acrylonitrile (AN), and it was made to dissolve in it. By the sodium hydroxide, it adjusted to peta8 and N-vinyl acetamide (NVA) (20g), acrylonitrile (AN) (10g), and sodium hypophosphite (0.25g) were dissolved. After a reactor was immersed into a 50-degree C thermostat, it agitated contents violently and nitrogen aeration removed dissolved oxygen, the 2 and 2'-azobis (2-amidinopropane) dihydrochloride (0.5g) dissolved in 5g of water was added, and it was made to react under nitrogen aeration. The viscosity of the 1.2-% of the weight solution of the obtained copolymer was 80cps. The obtained result is shown in Table 1.

[0052] N-vinyl acetamide (NVA) (250g) is put in, and water (740g) was added to the polymerization glass reactor of an example of comparison manufacture 2:N-vinyl acetamide (NVA), and it was made to dissolve in it. After nitrogen aeration removed dissolved oxygen in a 30-degree C thermostat, 2 and 2'-azobis [2-(2-imidazoline-2-IRU) propane] dihydrochloride (1.5g) dissolved in water (10g) was added, and it was made to react under nitrogen aeration. The product was dried at 50 degrees C after the reaction end for 5 hours. After removing moisture enough, it was made the powder of 100 or less meshes by small part ****. The 1.2-% of the weight solution viscosity of the obtained copolymer was 12cps.

[0053] The examples 3-5 of comparison manufacture: The monomer of a publication was made to react to Table 1 according to the example 1 of comparison. The obtained result is shown in Table 1.

[0054]

表 1

	重合体組成比			1．2重量%水溶液粘度（cps）	赤外吸収スペクトルの特性吸収（cm^{-1}）
	単量体(1)（重量%）	単量体(2)（重量%）	単量体(3)（重量%）		
製造例1	NVA（100）	−−	−−	178	1636, 1560
製造例2	NVA（60）	AMPSNa（30）	AN（10）	77	2241, 1635, 1558, 1486, 1375, 1210, 1042
製造例3	NVA（47）	AMPSNa（50）	AN（5）	43	2240, 1636, 1560, 1484, 1377, 1200, 1041
製造例4	NVA（70）	AMPSNa（30）	−−	53	1637, 1557, 1491, 1373, 1210, 1040
製造例5	NMVA（95）	−−	MMA（5）	55	1726, 1592, 1471, 1378
製造例6	NVF（78）	AMPSNa（20）	DMAM（2）	183	1650, 1540, 1500, 1373, 1200, 1038
製造例7	NVA（45）	MOESNa（45）	MMA（10）	84	1735, 1720, 1634, 1559, 1377, 1185, 1044
実地例8	NVF（85）	MOESNa（10）	AN（5）	134	2210, 1723, 1065, 1541, 1376, 1187, 1046
実地例9	NVA（75）	−−	VA（25）	28	1725, 1637, 1559

[0055]

表 1：（続き）

	重合体組成比			1．2重量%水溶液粘度（cps）	赤外吸収スペクトルの特性吸収（cm^{-1}）
	単量体(1)（重量%）	単量体(2)（重量%）	単量体(3)（重量%）		
製造例10	NVA（60）	AMPSNa（20）	DMAM（20）	162	1640, 1500, 1377, 1200, 1041
製造例11	NVA（35）	AMPSNa（30）	AN（35）	140	2242, 1636, 1557, 1486, 1375, 1210, 1042
製造例12	NMVA（60）	MOESNa（35）	AN（5）	123	2240, 1590, 1484, 1377, 1187, 1044
製造例13	NVA（60）	MOESNa（30）	MMA（10）	105	1735, 1634, 1559, 1377, 1185, 1044

製造例14	NVA (55)	AMPSNa (35)	VA (10)	190	1725, 1634, 1559, 1486, 1374, 1207, 1042
比較製造例 1	NVA (20)	AMPSNa (70)	AN (10)	80	
比較製造例 2	NVA (100)	--	--	12	
比較製造例 3	NVA (30)	AMPSNa (20)	MMA (50)	128	
比較製造例 4	NVA (70)	AMPSNa (20)	AN (10)	314	
比較製造例 5	NVA (70)	AMPSNa (20)	AN (10)	13200	

[0056] N[an NVA:N-vinyl acetamide an NMVA:N-methyl-N-vinyl acetamide, an NVF:N-vinyl formamide, an NEVF:N-ethyl-N-vinyl formamide, an AMPSNa:2-acrylamide-2-methyl-BUROPAN sulfone Hedychium thorium salt, MOESNa:2-methacryloiloxy-ethyl sulfonic-acid sodium salt, AN:acrylonitrile, MMA:methyl methacrylate, DMAM:N, and]-dimethyl acrylamide, VA: Vinyl acetate.

[0057] The following material was used in the concrete constituent of a [example of concrete constituent] example, and the example of comparison. Combination per concrete one m3 of each material is shown in Table 2. In addition, the air content in Table 2 is the value used on concrete combination calculation, and differs from the value measured in actual concrete.

[0058] Material-of-construction fine aggregate: What mixed the inland sand from Kimitsu, and the crushed sand from Ofunato by the weight ratio 9:1 (specific gravity 2.60), the crushed stone from coarse-aggregate:Iwase (specific gravity 2.63), a high-performance AE water-reducing agent:polycarboxylic-acid system, an AE water-reducing agent:ligninsulfonic-acid system, water:ion exchange water.

[0059]

表 2

W/C*1 (%)	s/a*2 (%)	空気量 (%)	単位量 (kg/m^3)			
			セメント	水	細骨材	粗骨材
50	53	4.5	356	178	915	821

*1 : W/C = (水重量/セメント重量) ×100

*2 : s/a = (細骨材体積/全骨材体積) ×100

[0060] The 50l. compulsion pan type mixer of the kneading methods was used. Fine particles, such as cement, the fine aggregate, and the coarse aggregate were first mixed for 10 seconds. next, the kneading water which dissolved admixtures, such as cement dispersing agent and a separation reduction agent, beforehand -- addition -- it mixed for 45 seconds and the mixer was suspended After failing to write the mortar adhering to the pars basilaris ossis occipitalis of a mixer, and the side, again, it kneaded for 45 seconds and discharged.

[0061] The slump flow test by the "slump cone" used by the usual concrete examination performed evaluation of a test-method fluidity. A slump cone with the upper-limit bore of 10cm, a soffit bore [of 20cm], and a height of 30cm is placed on the griddle arranged horizontally, and it is filled up with concrete, and pulls up calmly. Concrete spreads in the shape of a concentric circle mostly, and stops soon. Let time required by halt from the time of slump-cone raising be a "slump flow stop time." The path of the right-angled direction is measured to the major axis of the flare of the stopped

concrete, and it, and it considers as a "slump flow value." the funnel shown in the examination which investigates the separation resistance and the gap permeability of concrete at drawing 2 -- "by equipment -- V -- a funnel -- examination" was carried out The upper part is carrying out opening of the equipment of drawing 2 to the shape of a rectangle (L1=49cm, L2=7.5cm). the funnel from the opening upper limit (10) -- the depth to the opening edge (12) of 42.5cm and rectangle-like opening by 15 (H2)cm [the depth (H1) which results in rectangle-like (L2=7.5cm, L3=6.5cm) opening (11) of a subordinate edge] The shutter (not shown) which can be freely opened and closed to the soffit is prepared. A lower shutter is opened, after being filled up with concrete (about 10l.) and sounding it level from the upper part. It supposes "it is flowing-down time V funnel" the time which the completion of flowing down takes from opening, and the gap permeability of concrete is evaluated.
[0062] It has such a fluidity good generally, and aggregate separation resistance and gap permeability are so good that "it is flowing-down time V funnel" is short that a "slump flow value" is large. However, although "it is flowing-down time V funnel" is short, when a coarse aggregate remains in the concrete center section with a slump flow test, the integrity of the aggregate and mortar is not maintained but it is poor. Then, first, viewing investigated the gestalt after a slump flow halt, and pass time was evaluated V funnel about what was judged to be proper. By the method specified to JIS A 1128, the air content was calculated by capacity % in concrete.
[0063] Example 1: this example uses the polymer (**) of the previous examples 2, 3, 6, 11-14 of manufacture, and the examples 1-2 of comparison manufacture as a separation reduction agent, and searches for a character (fresh character) immediately after the manufacture in each cement constituent which added the ligninsulfonic-acid system AE water-reducing agent 0.25% to the cement weight 1.6%, and prepared the polycarboxylic-acid system high-performance AE water-reducing agent to the cement weight, and before after [60 minutes] concrete hardening. The result of a concrete examination is shown in Table 3.
[0064]

表 3

		練上がり後経過時間(分)	スランプフロー値(cm)	スランプフロー停止時間(秒)	スランプフローの状態	空気量(%)	Vロート流下時間(秒)	評価(*)
製造例	2	0	55.0	22.6	良好	1.6	44.8	◎
		60	57.5	38.6		1.6	51.0	
	3	0	59.0	25.1	普通	1.0	33.2	○
		60	52.0	31.3		1.0	70.7	
	6	0	53.5	25.0	普通	1.6	41.0	○
		60	48.0	33.2		1.8	55.6	
	11	0	57.0	21.5	普通	1.3	37.4	○
		60	48.5	26.4		1.2	52.1	
	12	0	56.5	21.2	普通	1.4	45.5	○
		60	51.5	35.5		1.4	68.8	
	13	0	55.5	27.4	普通	1.7	44.4	○
		60	49.5	36.7		1.6	66.4	
	14	0	52.5	24.6	普通	1.9	57.5	○
		60	47.5	28.1		1.7	71.3	
比較製造例	1	0	53.0	27.5	粘性大	1.6	28.8	×
		60	44.0	30.0		1.3	閉塞	
	2	0	60.5	31.5	分離	3.0	17.2	×
		60	51.0	23.0		2.9	閉塞	

*) ◎：非常に良好，　○：良好，　△：普通，　×：不良

[0065] the example 2 of manufacture -- a target -- the character was fully satisfied Since viscosity was a little small, although the slump flow value just behind ** of the agate ware of concrete was large, the example 3 of manufacture had a little large fall 60 minutes after, and the fall of aggregate separation resistance was also a little large [the example] so that it might see V funnel at flowing-down time. The example 11 of manufacture had the large fall of the slump flow value of 60 minutes after. The example 6 of manufacture became more smallish [a slump flow value]. The examples 12 and 13 of manufacture had the large fall of aggregate separation resistance a little. The example 14 of manufacture had generally a slump flow value and a little low aggregate separation resistance. In the example 1 of comparison manufacture, **** was observed in the center section. Moreover, lock out was produced in the examination V funnel. In the example 2 of comparison manufacture, the coarse aggregate (20) remained in the slump flow (15) center section of concrete, and generating of remarkable separation was shown. The situation is typically shown in drawing 3 . Moreover, the examination also produced lock out V funnel.

[0066] Example 2: this example changes various rates of addition, and the separation reduction agent of the example 2 of manufacture is used for it, and it searches for the character before concrete hardening. The water reducing agent carried out the amount addition of said of a polycarboxylic-acid system high-performance AE water-reducing agent and the ligninsulfonic-acid system AE water-reducing agent with the example 1 as well as an example 1. The result of a concrete examination is shown in Table 4.

[0067]

表 4

	分離低減剤の含有率 (g/m^3)	練上がり後経過時間（分）	スランプフロー値（cm）	スランプフロー停止時間（秒）	スランプフローの状態	空気量（%）	Vロート流下時間（秒）	評価（*）
実施例2	10	0	60.5	22.1	普通	1.1	24.5	△
		60	63.5	25.2		1.1	30.3	
	20	0	58.0	22.6	普通	1.3	30.2	○
		60	63.0	28.6		1.3	37.6	
	30	0	58.0	20.8	良好	1.5	24.7	◎
		60	60.0	42.6		1.6	37.5	
	40	0	55.0	22.6	良好	1.6	44.8	◎
		60	57.5	38.6		1.6	51.0	
	60	0	56.5	25.1	良好	1.7	41.4	◎
		60	56.5	35.4		1.6	54.9	
	80	0	54.0	23.9	良好	1.7	48.6	◎
		60	55.0	34.0		1.7	60.4	
	120	0	52.5	22.2	普通	1.6	57.5	○
		60	54.5	29.5		1.8	67.1	
	160	0	51.0	20.8	粘性	1.8	59.8	△
		60	51.5	27.3	やや大	1.9	70.0	
	200	0	49.5	20.1	粘性	1.8	69.5	△
		60	50.5	27.2	やや大	1.9	82.1	
比較例	0	0	62.5	20.8	分離	1.1	17.0	×
		60	65.0	23.5		1.2	23.8	
	240	0	46.5	18.8	粘性	2.1	68.7	×
		60	48.0	24.2	過大	2.1	閉塞	

*) ◎：非常に良好，　○：良好，　△：普通，　×：不良

[0068] In the separation reduction agent additive-free case shown as an example of comparison, the gestalt of a slump flow became unsuitable positive like the example 2 of comparison manufacture of an example 1. the rate increase of addition of a separation reduction agent -- a character -- the whole improvement was accepted, three or more 30 g/m then the coarse aggregate, and the mortar portion were united, the flow edge is arrived at, and it becomes sufficient character The viscosity of concrete became large and produced lock out by examination V funnel in three or more 240 g/m in three or more 160 g/m for a viscous fault size.

[0069] example 3: -- the concrete at the time of using the separation reduction agent of composition of the example 2 of manufacture (rate of addition : 40 g/m2), changing and manufacturing the amount of the polymerization initiator at the time of separation reduction agent manufacture like an example 1, and carrying out by changing viscosity -- a character is shown in Table 5

[0070]

表 5

分離低減剤 1.2重量% 水溶液粘度 (mpa・s)	練上がり後経過時間（分）	スランプフロー値（cm）	スランプフロー停止時間（秒）	スランプフローの状態	空気量（%）	Vロート流下時間（秒）	評価（*）
13	0	59.0	22.0	分離気味	0.9	23.7	△
	60	61.0	32.4		0.9	74.6	
20	0	57.5	22.1	普通	1.1	32.4	○
	60	59.5	30.3		1.0	68.3	
42	0	57.0	19.5	普通	1.3	50.4	○
	60	60.0	39.6		1.2	55.6	
81	0	54.0	18.5	普通	1.4	60.5	◎
	60	57.0	40.4		1.1	64.1	
90	0	54.5	15.0	良好	1.4	53.4	◎
	60	57.5	35.2		1.4	45.2	
104	0	55.5	19.1	良好	1.6	53.9	◎
	60	60.0	38.5		1.6	32.3	

[0071]

表5（続き）

分離低減剤 1.2重量% 水溶液粘度 (mpa・s)	練上がり後経過時間（分）	スランプフロー値（cm）	スランプフロー停止時間（秒）	スランプフローの状態	空気量（%）	Vロート流下時間（秒）	評価（*）
111	0	54.0	20.6	良好	1.8	27.9	◎
	60	58.0	34.8		1.7	55.6	
119	0	53.0	19.6	良好	1.5	45.4	◎
	60	57.0	27.9		1.6	54.9	
125	0	52.5	26.8	良好	2.1	58.6	◎
	60	54.5	31.2		2.1	70.9	
138	0	50.5	29.8	良好	2.7	61.7	◎

	60	52.0	33.6		2.6	70.4	
151	0	50.0	24.3	普通	2.8	60.2	○
	60	51.0	37.8		2.7	76.5	
177	0	48.5	29.5	粘性	2.7	56.5	○
	60	50.0	39.1	やや大	2.6	79.9	
200	0	48.0	32.0	粘性	2.9	63.1	○
	60	48.5	40.5	やや大	2.9	81.7	
224	0	47.5	33.6	粘性大	3.1	72.8	△
	60	46.5	31.2		2.8	94.1	

*) ◎：非常に良好. ○：良好. △：普通

[0072] With viscosity increase of a separation reduction agent, the slump flow value of 60 minutes after was small, and the inclination for flowing-down time to become long was accepted V funnel. That a desirable character is acquired was a range whose 1.2-% of the weight solution viscosity is 20-200cps.

[0073] Example 4: The separation reduction agent of the example 2 of manufacture of an example 1 was used (rate of addition : 40 g/m2), the ligninsulfonic-acid system AE water-reducing agent was added for the polycarboxylic-acid system high-performance AE water-reducing agent 0.25% to the cement weight 1.35% to the cement weight as a water reducing agent, 20% of the cement weight was replaced by the limestone impalpable powder from which specific surface area differs variously among 2 2,570-11,800cm, and it was performed like the example 1. the example of comparison which does not use a limestone impalpable powder -- concrete -- the result of a character is shown in Table 6

[0074]

表 6

	石灰石微粉末の比表面積 (cm^2/g)	練上がり後経過時間（分）	スランプフロー値（cm）	スランプフローの状態	スランプフロー停止時間（秒）	空気量（%）	Vロート流下時間（秒）	評価（*）
実施例4	2,550	0	56.5	普通	22.1	1.8	34.4	○
		60	58.5		25.2	1:8	30.3	
	3,870	0	58.0	良好	22.6	2.1	30.2	◎
		60	60.5		28.6	2.0	22.5	
	6,130	0	59.0	良好	19.5	2.4	23.0	◎
		60	64.0		30.1	2.4	18.1	
	8,410	0	58.0	良好	22.6	2.5	26.8	◎
		60	62.5		38.6	2.6	35.7	
	9,810	0	58.0	良好	18.2	2.7	28.7	◎
		60	60.5		26.0	2.5	40.1	
	11,800	0	57.0	良好	23.9	3.1	37.3	◎
		60	58.5		34.0	3.0	45.5	
比較例	0	0	55.0	普通	22.6	1.6	44.8	△
		60	57.5		38.6	1.6	51.0	

*) ◎：非常に良好. ○：良好. △：普通

[0075] Example 5: In the example 4, specific surface area used the thing of 2 6,130cm as a limestone impalpable powder, and among 5 - 50 % of the weight, the substitutional rate to the cement was

changed variously, and was carried out. the example of comparison which does not use a limestone impalpable powder -- concrete -- the result of a character is shown in Table 7

[0076]

表 7

	セメント重量に対する石灰石微粉末の置換率 (%)	練上がり後経過時間 (分)	スランプフロー値 (cm)	スランプフローの状態	スランプフロー停止時間 (秒)	空気量 (%)	Vロート流下時間 (秒)	評価 (*)
実施例	5	0	56.5	普通	22.1	1.8	34.4	○
		60	58.5		25.2	1.8	30.3	
	10	0	58.0	良好	22.6	2.1	30.2	◎
		60	61.5		28.6	2.0	22.5	
	20	0	59.0	良好	19.5	2.4	23.0	◎
		60	64.0		30.1	2.4	18.1	
	30	0	57.0	良好	22.6	2.5	26.8	◎
		60	60.5		38.6	2.6	35.7	
	40	0	57.0	普通	18.2	2.7	28.7	○
		60	58.5		26.0	2.5	40.1	
	50	0	54.0	粘性大	23.9	3.1	37.3	△
		60	58.0		34.0	3.0	47.6	
比較例	0	0	55.0	普通	22.6	1.6	44.8	△
		60	57.5		38.6	1.6	51.0	

*) ◎ : 非常に良好. ○ : 良好. △ : 普通

[0077] Table 6 and 7 shows that use the separation reduction agent of this invention, and a slump flow value becomes large, flowing-down time is shortened V funnel, and a character improves further by using an impalpable powder together simultaneously.

[0078]

[Effect of the Invention] As explained above, a high fluidity and the outstanding material separation resistance can be given to a concrete constituent by adding the separation reduction agent for concrete constituents which consists of an N-vinyl carboxylic-acid amide system resin by this invention. According to this invention, in the usual freshly-mixed-concrete plant, it becomes possible to obtain comparatively easily the concrete constituent excellent in self-restoration nature, a fluidity, and material separation resistance, without performing admixture tank extension etc. By moreover, use of very a small amount of separation reduction agent (water soluble polymer) and high-performance AE water-reducing agent In the usual amount of unit cement usually almost equivalent to concrete, it excels in a fluidity. And the concrete constituent which cannot start separation or bleeding of the aggregate easily is offered. for example, also in the place which cannot be easily filled up with concrete like the cross section of a complicated configuration, or the cross section by which reinforcement is arranged densely It can be filled up with concrete dense, without carrying out an oscillating compaction, and it is homogeneous, the high concrete structure of endurance is built, and laborsaving of construction and the fall of noise can be aimed at. As the result, it cannot be influenced by an operator's technology or construction method, but the quality concrete structure can be built, and stabilization of the quality of concrete and improvement in endurance can be aimed at.

[Translation done.]

* NOTICES *

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the infrared-absorption-spectrum view of the copolymer obtained in the example 1 of manufacture.
[Drawing 2] It is drawing which is the 1 evaluation method of the grade aggregate separation and in which showing experimental equipment V funnel.
[Drawing 3] In a slump flow test, it is drawing showing the situation which separation of a coarse aggregate produced.
[Description of Notations]
10 Opening Upper Limit
11 Funnel -- Subordinate Edge
12 Lower Opening Edge
15 Slump Flow
20 Coarse Aggregate

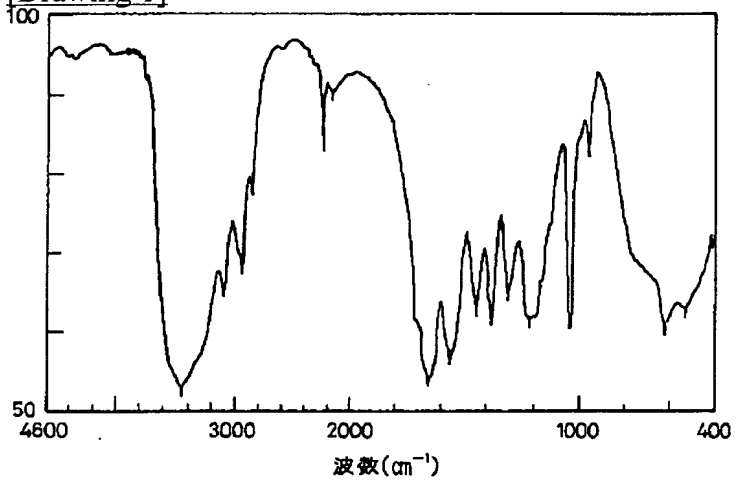
[Translation done.]

* NOTICES *

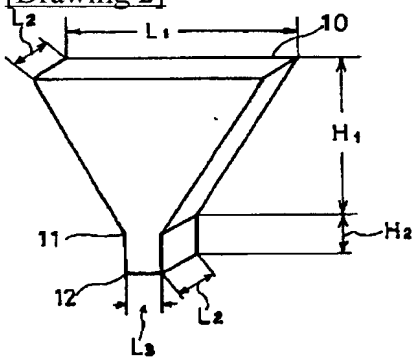
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

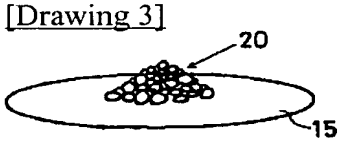
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1] General formula (1)
Ceta2=CHNR1COR2 (1)
(-- among a formula, even if R1 and R2 are the same, they may differ from each other, and they express an each hydrogen atom or a methyl group 40 - 89 % of the weight of units originating in the compound shown by), and general formula (2)
CH2=CR3X1R4SO3X2 (2)
(-- R3 expresses a hydrogen atom or a methyl group among a formula, R4 expresses the straight chain-like alkylene machine of carbon numbers 1-4, or the letter alkylene machine of branching, X1 expresses -CONeta- or -COO-, and X2 expresses a hydrogen atom, alkali metal, an ammonium salt, or an organic ammonium salt 10 - 50 % of the weight of units originating in the compound shown by), and general formula (3)
Ceta2=CR 5X3 (3)
(R5 expresses a hydrogen atom or a methyl group among a formula, and X3 expresses -CN, -COOR6, -CONeta2, -CONHR7, -COR8, -OCOR9, or -OR10.) However, R6 expresses the alkyl group of a hydrogen atom, alkali metal, an ammonium salt, an organic ammonium salt, or carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by Oeta or -NR 11R12. Moreover, R7 expresses the alkyl group of carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by OH or -NR 11R12. R8, R9, R10, R11, and R12 express the alkyl group of carbon numbers 1-4 1 - 30 % of the weight (general formula (1) total of the unit originating in the compound shown by - (3) may be 100 % of the weight.) of units originating in the compound shown from -- the becoming copolymer
[Claim 2] General formula (1)
Ceta2=CHNR1COR2 (1)
(-- among a formula, even if R1 and R2 are the same, they may differ from each other, and they express an each hydrogen atom or a methyl group 10 - 100 % of the weight of units originating in the compound shown by), and general formula (2)
CH2=CR3X1R4SO3X2 (2)
(-- R3 expresses a hydrogen atom or a methyl group among a formula, R4 expresses the straight chain-like alkylene machine of carbon numbers 1-4, or the letter alkylene machine of branching, X1 expresses -CONeta- or -COO-, and X2 expresses hydrogen, alkali metal, an ammonium salt, or an organic ammonium salt 0 - 60 % of the weight of units originating in the compound shown by), and general formula (3)
Ceta2=CR 5X3 (3)
(R5 expresses a hydrogen atom or a methyl group among a formula, and X3 expresses -CN, -COOR6, -CONeta2, -CONHR7, -COR8, -OCOR9, and -OR10.) However, R6 expresses the alkyl group of a hydrogen atom, alkali metal, an ammonium salt, an organic ammonium salt, or carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by Oeta or -NR 11R12. Moreover, R7 expresses the alkyl group of carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by OH or -NR 11R12. R8, R9, R10, R11, and R12 express the alkyl group of carbon numbers 1-4 0 - 40 % of the weight (general formula (1) total of the unit originating in the compound shown by - (3) may be 100 % of the weight.) of units originating in the compound shown The separation reduction agent for high fluidity concrete constituents characterized by the bird clapper from a polymer (**).
[Claim 3] The separation reduction agent for high fluidity concrete constituents according to claim 2 which consists of a polymer of the unit originating in the compound shown by the general formula (1).
[Claim 4] The separation reduction agent for high fluidity concrete constituents according to claim 2

which consists of 40 - 89 % of the weight of units originating in the compound shown by the general formula (1), 10 - 50 % of the weight of units originating in the compound shown by the general formula (2), and 1 - 30 % of the weight (however, total of the unit originating in the compound shown by general formula (1) - (3) may be 100 % of the weight. of units originating in the compound shown by the general formula (3).
[Claim 5] The separation reduction agent for high fluidity concrete constituents according to claim 3 or 4 whose 1.2-% of the weight solution viscosity of the cement supernatant of a polymer according to claim 3 or 4 (**) is less than 200cps in 20cps or more in B type rotational viscometer.
[Claim 6] It consists of cement, a coarse aggregate, a fine aggregate, cement dispersing agent, a separation reduction agent, and water, and a separation reduction agent is a general formula (1) at least.
Ceta2=CHNR1COR2 (1)
(-- among a formula, even if R1 and R2 are the same, they may differ from each other, and they express an each hydrogen atom or a methyl group High fluidity concrete constituent characterized by being a polymer including the unit (**) originating in the monomer shown by).
[Claim 7] It consists of cement, a coarse aggregate, a fine aggregate, cement dispersing agent, a separation reduction agent, and water, and a separation reduction agent is a general formula (1).
Ceta2=CHNR1COR2 (1)
(-- among a formula, even if R1 and R2 are the same, they may differ from each other, and they express an each hydrogen atom or a methyl group 40 - 89 % of the weight of units originating in the monomer shown by), and general formula (2)
CH2=CR3X1R4SO3X2 (2)
(-- R3 expresses a hydrogen atom or a methyl group among a formula, R4 expresses the straight chain-like alkylene machine of carbon numbers 1-4, or the letter alkylene machine of branching, X1 expresses -CONeta- or -COO-, and X2 expresses a hydrogen atom, alkali metal, an ammonium salt, or an organic ammonium salt 10 - 50 % of the weight of units originating in the compound shown by), and general formula (3)
Ceta2=CR 5X3 (3)
(R5 expresses a hydrogen atom or a methyl group among a formula, and X3 expresses -CN, -COOR6, -CONeta2, -CONHR7, -COR8, -OCOR9, or OR10.) However, R6 expresses the alkyl group of a hydrogen atom, alkali metal, an ammonium salt, an organic ammonium salt, or carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by Oeta or -NR 11R12. Moreover, R7 expresses the alkyl group of carbon numbers 1-4, and is one hydrogen atom of the alkyl group. - It can replace by OH or -NR 11R12. R8, R9, R10, R11, and R12 express the alkyl group of carbon numbers 1-4 1 - 30 % of the weight (general formula (1) total of the unit originating in the compound shown by - (3) may be 100 % of the weight.) of units originating in the compound shown The high fluidity concrete constituent according to claim 6 which is the polymer included (**).
[Claim 8] The high fluidity concrete constituent according to claim 6 or 7 whose 1.2-% of the weight solution viscosity which used the cement supernatant is 20-200cps.
[Claim 9] A high fluidity concrete constituent given in the claim 6 whose content of a separation reduction agent is 10 - 200 g/m3 to the total amount of a high fluidity concrete constituent, or one term of 8.
[Claim 10] the amount of unit cement of concrete ** -- the unit quantity of 200 - 450 kg/m3 and a fine aggregate -- the unit quantity of 700 - 1,100 kg/m3 and a coarse aggregate -- 700 - 1,200 kg/m3 and a unit -- a high fluidity concrete constituent given in the claim 6 whose addition of the separation reduction agent whose amount of water is 155 - 220 kg/m3 and a water soluble polymer is 10 - 200 kg/m3, or one term of 9
[Claim 11] A high fluidity concrete constituent given in the claim 6 at which the slump flow value by JIS A 1101 maintains 45cm or more over [after kneading] at least 60 minutes, or one term of 10.
[Claim 12] some cement -- initial hydration of brain trust specific-surface-area of 2,500-200,000cm

2/g -- a high fluidity concrete constituent given in the claim 6 replaced to 50 % of the weight by the inactive impalpable powder, or one term of 11

[Translation done.]